ORIGINAL

D-4-72 5230

ASH DIEBACK

ON THE ALLEGHENY NATIONAL FOREST

By

W. LAUTZ, PATHOLOGIST

and

J. M. REID, BIOLOGICAL LABORATORY TECHNICIAN

DELAWARE FOREST PEST MANAGEMENT FIELD OFFICE
USDA - FOREST SERVICE
PO BOX 365, DELAWARE, OHIO 43015

ABSTRACT

White ash in two study areas on the Allegheny National Forest were examined over a period of five years to estimate the progress of the ash dieback disease. Under conditions existing from 1966 to 1971, an average 60-year-old white ash tree was estimated to have a further life expectancy of 20 to 25 years.

INTRODUCTION

On the Allegheny National Forest, white ash constitutes from 2 to 4 percent of the timber volume, and a greater proportion of the monetary value. Some of the best sawtimber sells for $300 to $400 per thousand board feet. A survey of ash dieback in New York in 1960 and 1961 (Silverborg, 1968) showed that 37 percent of the white ash trees were declining or dead. Tegethoff and Brandt (1964) found 27 percent of the ash inspected to be dying or dead in New Hampshire, Vermont, Massachusetts, Connecticut, and Pennsylvania.

White ash trees on the Bradford District of the Allegheny National Forest have been in several stages of decline, or classes, that are described in Table 1 and are illustrated in Figures 1 to 4. This study was designed to estimate the rate of progress of dieback from each of the classes toward further advanced classes of decline symptoms, including the last class "tree dead." This information is needed for land managers to plan salvage operations.

TABLE 1. DIEBACK SYMPTOM CLASSES [1/]

Class	Symptoms
1	Trees healthy; leaves dark green; no dead bare twigs in living crown (Fig. 1).
2	Top thin; leaves tending to clump at end of twigs; foliage paler green than normal; leaves may be dwarfed; some dead twigs; possibly some cankers at base of twigs (Fig. 2).
3	Twigs dying back; less than 50 percent of crown dead; leaves clumped at end of twigs and branches, and leaflets dwarfed; foliage pale green; cankers possibly visible on branches and stems (Fig. 3)
4	Branches dying back; more than 50 percent of crown dead, epicormic branches may be present, leaves clumped, and leaflets dwarfed; foliage pale green; cankers sometimes visible on branches and stems (Fig. 4).
5	Tree dead.

1/ Taken from an article by Tegethoff and Brandt (1964).

Fig. 1. White ash dieback Class I.

Fig. 2. White ash dieback Class II.

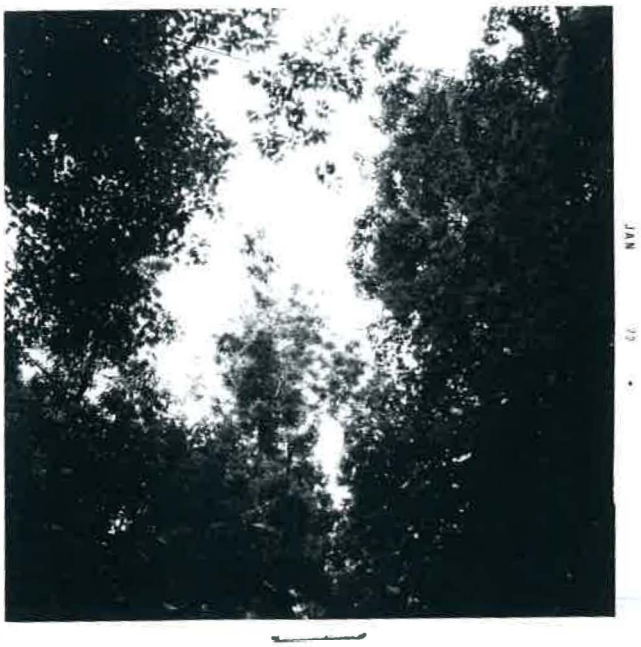

Fig. 3. White ash dieback Class III.

Fig. 4. White ash dieback Class IV.

METHODS

Two areas, about 150 acres each, on the Bradford District of the Allegheny National Forest were selected for study.[1/] One is 7 miles west of Bradford, and the other 15 miles east of Warren. There were about 1,000 white ash trees in each of the areas, a higher concentration than average for the Forest. Other trees were cherry, maple, oaks, and mixed hardwoods. From personal contact with other workers, we estimated that the general rate of decline is about the same as in nearby parts of Pennsylvania and New York.

Two hundred trees were selected and numbered for the study, 50 in each of the first four dieback classes. Age range at that time was 45-73 years with an average age of 62. Average diameter at breast height (dbh) was 10.7 inches and average total height was 76 feet.

To form a base for determining growth or decline, height and dbh were measured for each of the 200 trees in June, 1966. In June, 1968, 194 of the 200 trees were located and re-examined and the same measurements were taken. In July, 1971, the same information was obtained on 147 trees. The other 53 trees had broken in storms, had been cut, or had lost identifying marks.

RESULTS

Average change in dieback class over 5 years was 0.92 class (Table 2). This means that on the average, a tree in any given class in 1966 would be placed in the next dieback class in 1971. Some trees did not change class and some changed two or three classes.

1/ Original work plan was developed and selection of study areas and trees was made by T. Craig Weidensaul, now with Ohio Agricultural Research and Development Center, Wooster, O.

TABLE 2. CHANGES IN DIEBACK CLASSES IN 2 AND IN 5 YEARS.

Class	1966 Number of trees	1968 Average class	1966-68 Average class change	1971 Average class	1966-71 Average class change
I	44	1.73	+0.73	2.34	+1.34
II	34	2.62	+0.62	3.06	+1.06
III	36	3.67	+0.67	3.58	+0.58
IV	33	4.33	+0.33	4.58	+0.58
V	0				
		Mean change	+0.53		+0.92
		Mean annual change	+0.27		+0.18

RESULTS (cont.)

Reduction in size and number of leaves associated with Classes II to IV was the cause of reduction in diameter increase (Table 3), or both were the result of a more basic problem. Trees may be weakened by inadequate precipitation or an unfavorable distribution of precipitation (Table 4). Silverborg (1968) has made this observation in connection with a similar study in New York State. Ross (1964) found a dependence on drought conditions associated with canker development.

For salvage planning, assumptions based on this study are that if conditions remain the same in the Allegheny National Forest:

Class II trees will have 2/3-3/4 the diameter increase of Class I trees and Class III trees about 1/3-2/5 diameter increase of Class I trees.

Class III trees will have reduced growth in about 8 years and die in 13-15 years.

Class IV trees will have little growth, and the majority will die in five years.

A different distribution of precipitation or change in other climatic factors may modify the effects of dieback on ash, accelerating or reducing the change to a more severe state of decline.

TABLE 3. INCREASE IN DIAMETER ASSOCIATED WITH CHANGE IN DIEBACK CLASS.

1966-1968 Class change	Mean dbh Increase in inches		1966-1971 Class change	Mean dbh Increase in inches	
I - I	0.40	a[2]	I	0.88	a[2]
I - II	0.31	a	I - II	0.86	a
II - II	0.30	a	II - II	0.59	b
II - III	0.13	b	II - III	0.55	b
III - III	0.15	b	III - III	0.39	c
I - III	0.14	b	I - III	0.35	c
III - IV	0.20	b	III - IV	0.27	c
II - IV	0.13	b	II - IV	0.20	c
IV - IV	0.06	c	IV - IV	0.20	c

1/ Mean 1966 diameter - 10.6 inches
2/ a, b, etc. - Class changes that are not followed by the same letter are statistically different at the 99 percent level.

TABLE 4. DISTRIBUTION OF ANNUAL PRECIPITATION AT WARREN, PENNSYLVANIA, FROM 1960 to 1970.[1]

Year	Year's deficit Inches	Year's surplus Inches	Cumulative deficit Inches[2]
1960	7.9	-	7.9
1961	0.6	-	8.5
1962	3.5	-	12.0
1963	10.5	-	22.5
1964	-	0.1	22.4
1965	3.8	-	26.2
1966	3.1	-	29.3
1967	-	1.6	27.7
1968	1.4	-	29.1
1969	-	0.1	29.0
1970	-	9.3	19.7

1/ From climatological data tables, U. S. Dept. of Commerce. Normal annual precipitation 42.7 inches.
2/ Beginning with 1960.

Distribution List - D-4-72

Allegheny National Forest	5
A. R. Bond, State Forester Department of Forests & Parks State Office Building Annapolis, Md. 21404	1
A. E. Cole, Director Plant Pest Control Division West Virginia Dept. of Agriculture Charleston, W. Va. 25305	1
Forest Insect & Disease Laboratory Northeastern Forest Experiment Station 151 Sanford Street Hamden, Conn. 06514	1
Tunis J. Lyon Department of Forests & Parks State Office Building Annapolis, Md.21404	1
Lester McClung, State Forester W. Va. Dept. of Natural Resources Division of Forestry State Capitol Charleston, W. VA. 25305	1
Portsmouth FPM Field Office U. S. F. S., NA-S&PF Federal Building Portsmouth, New Hampshire 03801	1
R. G. Doerner, R-9	1
St Paul FPM Field Office USFS, NA-S&PF Federal Building St. Paul, Minn. 55113	1

Wayne Sinclair 1
Department of Plant Pathology
Cornell University
Ithaca, N. Y.

Barry Towers 1
Pa. Dept. Environmental Resources
Bureau of Forestry
PO Box 1467
Harrisburg, Pa. 17120

Craig Weidensaul 1
Lab. for Environmental Studies
Ohio Agricultural Research & Development Center
Wooster, Ohio 44691

FPM, Upper DArby 5

NEFES - L. S. Dochinger 1

REFERENCES CITED

Ross, E. W. 1964. Cankers associated with ash dieback. Phytopath. 54:272-275.

Silverborg, S. B. and E. W. Ross. 1968. Ash dieback disease development in New York State. Plant Disease Reptr. 52:105-107.

Tegethoff, A. C. and R. W. Brandt. 1964. Ash dieback in New Hampshire, Vermont, Massachusetts, Connecticut, New Jersey, and Pennsylvania, 1963. Plant Disease Reptr. 48:974-977.